
Md. Imran Uddin\textsuperscript{a,}\textsuperscript{*}, M. Rafiqul Islam\textsuperscript{b}, Zobair Ibn Awal\textsuperscript{b}, Kazi Md. Shifun Newaz\textsuperscript{a}

\textsuperscript{a}Accident Research Institute (ARI), Bangladesh University of Engineering and Technology (BUET), Dhaka-1000, Bangladesh
\textsuperscript{b}Department of Naval Architecture and Marine Engineering (NAME), Bangladesh University of Engineering and Technology (BUET), Dhaka-1000, Bangladesh

Abstract
The Inland Water Transportation (IWT) system of Bangladesh is one of the most significant modes of transportation for being easily accessible and less expensive. Though Bangladesh own geographical benefit of having a huge inland waterway network but there are severe safety deficiencies in this sector. This study has analyzed the data of accidents that took place during 2005 to 2015 in the inland waterways of Bangladesh. Accident data were collected from the Department of Shipping (DOS) of Bangladesh. The accidents has been analyzed according to different variables such as vessel types, location of accidents, time distribution of accidents, final condition of vessels after the occurrence of accidents and others. A total of 229 accidental cases were considered for the study. The Geographical Information System (GIS) is applied for identifying the most vulnerable locations and waterway routes for waterway accidents on the basis of frequency of the occurrence of accidents. The analysis revealed that the major causes of waterway accidents are collision, Nor’wester or storm, overloading, stability failure, excessive current, bottom damage. The analysis shows that cargo vessels and passenger vessels are facing more accidents compared to other types of vessels. It was also observed that many accidents and relevant information often remain unreported. Moreover, the recorded waterway accident data are also not much informative for conducting standard research works. Finally, some recommendations are put forward with a vision to build up a safer waterway transportation system for Bangladesh and for further research and investigations.

1. Introduction
Bangladesh possesses an exclusive geographic location having a massive network of approximately 700 rivers which is about 7\% of the total area of the country. The entire area of the country consists of 24,000 km extensive network of inland waterways [1]. The Inland Water Transportation (IWT) system of Bangladesh is the oldest mode of transportation that carries nearly one third of total passengers and goods of the country. The length of navigable inland waterways is approximately 5,968 km, which however, decrease to 3,600 km during dry seasons. Different types of vessels use to ply over the inland waterways of Bangladesh like Cargo vessels, Passenger Launches and ferries, Fishing vessels and boats, oil tankers, steamers, trawlers and country boats etc.

\textsuperscript{*} Corresponding author. Tel.:+88-02-58610081/7897, Fax: +88-02-58610081
E-mail address: mdimran.buet@gmail.com
But, in spite of having such vast waterway network and transportation significance, safety in this sector is not ensured at all. In Bangladesh, waterway accident and associated fatalities and injuries are still taking place. But, these accidents do not occur due to a single factor. As described by Islam [2], BIWTA [3] and Chowdhury [4] the factors that generate the waterway accidents are vessel design factor, operating environment factor, human factor, enforcement and educational factor. All types of vessel face accident more or less in Bangladesh. Passenger vessel accident is a serious issue for Bangladesh. An analysis of passenger vessel accidents of Bangladesh was done by Awal et al. [5] where some significant findings were found and some important recommendations were put forward. Another study by Awal et al. [6] analysed the collision type of accidents by the marine vehicles of Bangladesh. An investigation by Islam et al. [7] analysed the maritime accidents of Bangladesh specially the overloading and inclement weather related accidents. A study by Awal [8] dealing with 197 accidents revealed that majority of the accidents during 1995-2005 in the inland waterways of Bangladesh had occurred due to overloading and cyclone (43% of total accidents). In Bangladesh different types of waterway accidents take place, such as collision, Nor’wester or storm, overloading, stability failure, excessive current, bottom damage, structural failure and others. Collision type accidents occur by the contact of a vessel with another vessel or any other permanent obstructions on the waterway like pillar of bridge and etc. Accidents due to Nor’wester or storm and excessive current generally occur during monsoon season when the weather frequently becomes inclement in nature. Overloading can be defined as carrying load that is excess to the designed capacity of a vessel. Iqbal et al. [9] mentioned that overloading is not a pure naval architecture problem. Stability failure type accidents usually occur due to poor design of vessels. Accidents related to excessive current take place due to high tide and excess water wave created by the nearby moving vessel. Bottom damage refers to the damage of underside hull of a vessel by any underwater obstruction. Structural failure related accident refers to any mechanical failure or structural damage in the vessel.

According to the database of Department of Shipping (DOS) of Bangladesh, nearly eighteen hundred people have died, injured and found missing due to inland waterway accidents in the last ten years (2005-2015). But, it is important to mention that, the accidents of the unregistered vessels and boats are not recorded by the relevant authorities of the government. So, it can be said that significant number of waterway accidents are not reported and thus the above mentioned statistics do not reveal the actual situation of waterway accidents. That means the actual number of casualties is even more than the stated value. So it can be claimed undoubtedly that the accidents of the inland waterways have become a serious issue for the whole nation at present.

2. Data collection and database development

An authentic and comprehensive database is required to carry out accident related research activities. One of the major objectives of this study is to accumulate and maintain a technical database from which detailed analysis of accidents and research works can be carried out. The waterway accident data were collected from the Department of Shipping (DOS) of Bangladesh. Though the source is authentic, but the technical standard of reporting is poor. Many of the vital parameters of the accidents are not reported at all. Awal et al. [5] developed a spreadsheet database structure for the analysis of passenger vessel accidents in Bangladesh. A database structure similar to that structure has been developed based on some technical information consisting of 6 main categories. These categories are then grouped into 17 sub-categories. Fig. 1 shows the database structure.

3. Accident analysis

3.1. Accident type

In this study, different types of accidents were identified; such as collision, Nor’wester or storm, overloading, stability failure, excessive current, bottom damage, structural failure and others. Their respective percentages are shown in Fig. 2. From the analysis it is quite apparent that collision (60.3%) is the dominant cause of the accidents. Nor’wester or storm related accidents (8.7%) take place when the weather is inclement in nature.
دریافت فوری

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